

DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

Final: May 16, 2001

RCRA Corrective Action Environmental Indicator (EI) RCRIS Code (CA725)

Current Human Exposures Under Control

Facility Name: NRG Fossil Fuel Plant – Devon Station
Facility Address: Naugatuck Ave
Facility EPA ID #: CTD 000845248

1. Has all available relevant/significant information on known and reasonably suspected releases to soil, groundwater, surface water/sediments, and air, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been considered in this EI determination?

If yes - check here and continue with #2 below.

If no - re-evaluate existing data, or

If data are not available skip to #6 and enter "IN" (more information needed) status code.

BACKGROUND

Definition of Environmental Indicators (for the RCRA Corrective Action)

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EIs developed to-date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

Definition of "Current Human Exposures Under Control" EI

A positive "Current Human Exposures Under Control" EI determination ("YE" status code) indicates that there are no "unacceptable" human exposures to "contamination" (i.e., contaminants in concentrations in excess of appropriate risk-based levels) that can be reasonably expected under current land- and groundwater-use conditions (for all "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

Relationship of EI to Final Remedies

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EI are near-term objectives, which are currently being used as Program measures for the Government Performance and Results Act of 1993, GPRA). The "Current Human Exposures Under Control" EI are for reasonably expected human exposures under current land- and groundwater-use conditions ONLY,

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and do not consider potential future land- or groundwater-use conditions or ecological receptors. The RCRA Corrective Action program's overall mission to protect human health and the environment requires that Final remedies address these issues (i.e., potential future human exposure scenarios, future land and groundwater uses, and ecological receptors).

Duration / Applicability of EI Determinations

EI Determinations status codes should remain in RCRIS national database ONLY as long as they remain true (i.e., RCRIS status codes must be changed when the regulatory authorities become aware of contrary information).

2. Are groundwater, soil, surface water, sediments, or air media known or reasonably suspected to be "contaminated"¹ above appropriately protective risk-based "levels" (applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action (from SWMUs, RUs or AOCs)?

"Contaminated" Media	Yes	No	?	Rationale/Key Contaminants
Groundwater	X			See notes to 725-2.
Air (indoors)		X		See notes to 725-2.
Soil (surface, e.g., <2 ft)	X			See notes to 725-2.
Surface Water		X		See notes to 725-2.
Sediment		X		See notes to 725-2.
Soil (subsurface e.g., >2 ft)	X			See notes to 725-2.
Air (outdoors)		X		See notes to 725-2.

_____ If no (for all media) - skip to #6, and enter "YE," status code after providing or citing appropriate "levels," and referencing sufficient supporting documentation demonstrating that these "levels" are not exceeded.

 X If yes (for any media) - continue after identifying key contaminants in each "contaminated" medium, citing appropriate "levels" (or provide an explanation for the determination that the medium could pose an unacceptable risk), and referencing supporting documentation.

_____ If unknown (for any media) - skip to #6 and enter "IN" status code.

Rationale and Reference(s): See notes to 725-2.

Footnotes:

¹ "Contamination" and "contaminated" describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of

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appropriately protective risk-based “levels” (for the media, that identify risks within the acceptable risk range).

² Recent evidence (from the Colorado Dept. of Public Health and Environment, and others) suggest that unacceptable indoor air concentrations are more common in structures above groundwater with volatile contaminants than previously believed. This is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration necessary to be reasonably certain that indoor air (in structures located above (and adjacent to) groundwater with volatile contaminants) does not present unacceptable risks.

3. Are there complete pathways between “contamination” and human receptors such that exposures can be reasonably expected under the current (land- and groundwater-use) conditions?

Summary Exposure Pathway Evaluation Table

Potential Human Receptors (Under Current Conditions)

“Contaminated” Media	Residents	Workers	Day-Care	Construction	Trespassers	Recreation	Food
Groundwater	No	No	No	No	No	No	No
Air (indoors)	-	-	-	-	-	-	-
Soil (surface, e.g., <2 ft)	No	Yes	No	Yes	Yes	No	No
Surface Water	-	-	-	-	-	-	-
Sediment	-	-	-	-	-	-	-
Soil (subsurface e.g., >2 ft)	No	No	No	Yes	No	No	No
Air (outdoors)	-	-	-	-	-	-	-

Instructions for Summary Exposure Pathway Evaluation Table:

1. Strike-out specific Media including Human Receptors’ spaces for Media which are not “contaminated”) as identified in #2 above.
2. Enter “yes” or “no” for potential “completeness” under each “Contaminated” Media -- Human Receptor combination (Pathway).

Note: In order to focus the evaluation to the most probable combinations some potential “Contaminated” Media - Human Receptor combinations (Pathways) do not have check spaces (“___”). While these combinations may not be probable in most situations they may be possible in some settings and should be added as necessary.

_____ If no (pathways are not complete for any contaminated media-receptor combination) - skip to #6, and enter “YE” status code, after explaining and/or referencing condition(s) in-place, whether natural or man-made, preventing a complete exposure pathway from each contaminated medium (e.g., use optional Pathway Evaluation Work Sheet to analyze major pathways).

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 X If yes (pathways are complete for any “Contaminated” Media - Human Receptor (combination) - continue after providing supporting explanation.

_____ If unknown (for any “Contaminated” Media - Human Receptor combination) - skip to #6 and enter “IN” status code.

Rationale and Reference(s): See notes to 725-3 .

³ Indirect Pathway/Receptor (e.g., vegetables, fruits, crops, meat and dairy products, fish, shellfish, etc.).

4. Can the exposures from any of the complete pathways identified in #3 be reasonably expected to be “significant”⁴ (i.e., potentially “unacceptable” because exposures can be reasonably expected to be: 1) greater in magnitude (intensity, frequency and/or duration) than assumed in the derivation of the acceptable “levels” (used to identify the “contamination”); or 2) the combination of exposure magnitude (perhaps even though low) and contaminant concentrations (which may be substantially above the acceptable “levels”) could result in greater than acceptable risks)?

 X If no (exposures can not be reasonably expected to be significant (i.e., potentially “unacceptable”) for any complete exposure pathway) - skip to #6 and enter “YE” status code after explaining and/or referencing documentation justifying why the exposures (from each of the complete pathways) to “contamination” (identified in #3) are not expected to be “significant.”

_____ If yes (exposures could be reasonably expected to be “significant” (i.e., potentially “unacceptable”) for any complete exposure pathway) - continue after providing a description (of each potentially “unacceptable” exposure pathway) and explaining and/or referencing documentation justifying why the exposures (from each of the remaining complete pathways) to “contamination” (identified in #3) are not expected to be “significant.”

_____ If unknown (for any complete pathway) - skip to #6 and enter “IN” status code

Rationale and Reference(s): See notes to 725-4 .

⁴ If there is any question on whether the identified exposures are “significant” (i.e., potentially “unacceptable”) consult a human health Risk Assessment specialist with appropriate education, training and experience.

5. Can the “significant” exposures (identified in #4) be shown to be within acceptable limits?

_____ If yes (all “significant” exposures have been shown to be within acceptable limits) - continue and enter “YE” after summarizing and referencing documentation justifying why all “significant” exposures to “contamination” are within acceptable limits (e.g., a site-specific Human Health Risk Assessment).

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_____ If no (there are current exposures that can be reasonably expected to be "unacceptable")- continue and enter "NO" status code after providing a description of each potentially "unacceptable" exposure.

_____ If unknown (for any potentially "unacceptable" exposure) - continue and enter "IN" status code

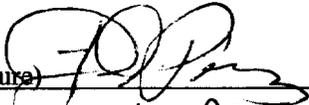
Rationale and Reference(s): Per the Instructions to 725-4, this section is not applicable.

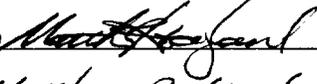
6. Check the appropriate RCRIS status codes for the Current Human Exposures Under Control EI event code (CA725), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (and attach appropriate supporting documentation as well as a map of the facility):

X YE - Yes, "Current Human Exposures Under Control" has been verified. Based on a review of the information contained in this EI Determination, "Current Human Exposures" are expected to be "Under Control" at the NRG Fossil Fuel - Devon Station facility, EPA ID # CTD000845248, located at Milford Connecticut under current and reasonably expected conditions. This determination will be re-evaluated when the Agency/State becomes aware of significant changes at the facility.

_____ NO - "Current Human Exposures" are NOT "Under Control."

_____ IN - More information is needed to make a determination.

Completed by (signature)  Date 2/22/02
(print) Juan A. Pérez
(title) Environmental Scientist

Supervisor (signature)  Date 3/18/02
(print) Matthew R. Hagland
(title) Section Chief
(EPA Region or State) Reg. I.

Locations where References may be found:

- RCRA Groundwater Monitoring Program 1997 Annual Report (CL&P)
- Human Health Risk Assessment, May, 2001 (Metcalf & Eddy, Inc.)
- March, 1999 Phase I Environmental Site Assessment (Metcalf & Eddy, Inc.)
- April, 1999 Phase II Environmental Field Investigation Report (Metcalf & Eddy, Inc.)
- November, 1999 Supplemental Site Investigation Report (Metcalf & Eddy, Inc.)

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Contact telephone and e-mail numbers

(name) _____

(phone #) _____

(e-mail) _____

FINAL NOTE: THE HUMAN EXPOSURES EI IS A QUALITATIVE SCREENING OF EXPOSURES AND THE DETERMINATIONS WITHIN THIS DOCUMENT SHOULD NOT BE USED AS THE SOLE BASIS FOR RESTRICTING THE SCOPE OF MORE DETAILED (E.G., SITE-SPECIFIC) ASSESSMENTS OF RISK.

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**Rationale and References
For
Documentation of Environmental Indicator Determination
RCRA Corrective Action Environmental Indicator Code CA 725**

Background

Among the various environmental investigations conducted at the subject site was a Preliminary Assessment (PA), conducted by the USEPA. The EPA issued a Report of that PA on July 15, 1985. That report discussed the history of the site, and identified solid waste management units ("SWMUs") at the site, which were subject to RCRA regulation. The Report indicated that :

- From the early 1900's up until the early 1970's large quantities of fly ash were landfilled on the facility property. There were also numerous waste piles of coal scattered around the area. The fly and coal residue (and possibly some coal piles) had not been removed at the time of the PA. The EPA determined that these waste piles and the landfilled fly ash constitute a SWMU encompassing nearly all of the facility property. The EPA did not determine whether hazardous constituents had been released to the environment.
- The pipes and tanks associated with the facility's former wastewater treatment system constituted a SWMU.

That treatment facility included a single-membrane-lined surface impoundment (EB-2). The unit was designed to receive boiler chemical cleaning solvents, demineralizer regeneration wastewaters, and other maintenance washwater, prior to its eventual discharge to the Housatonic River. These wastewaters were determined to be RCRA hazardous due to corrosivity, as well as the occasional presence of chromium and/or lead.

While not discussed in that report, the facility also maintained a Hazardous Waste Management Container Storage Area (CSA) for the collection and storage of hazardous wastes prior to shipment and disposal off-site. This area was located in the vicinity of the oil storage tank farm and was constructed according to RCRA guidelines. The CSA had a total storage capacity of 72 55-gallon steel drums. That unit was clean closed, in accordance with a RCRA Closure Plan on May 1, 1991. There was no evidence of contaminated soil associated with that former unit.

A Phase I and Phase II Environmental Site Assessment conducted in 1998 & 1999, respectively, by CL&P & NRG indicates the following:

- The majority of the fly ash was landfilled on the hillside to the northeast of the NRG property. This unit, approximately 4.5 acres in size, was subsequently determined to be non-RCRA regulated, and was closed as a landfill in 1989, by being covered with an impermeable one-foot clay layer. The area is now heavily vegetated, and engineering and institutional controls limit access to this area;
- All coal storage and the remainder of ash disposal took place on the northern portion of the property, in the present location of the Bulk Fuel Storage area, the closed EB-2 area, and the existing wastewater treatment plant structures. The majority of this portion of the site is covered

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with roadways/parking lots or permanent structures, which minimize the possibility of direct contact with surface/subsurface soil, as well as wind entrainment of contaminated soil, and

- During the Phase I site visit, M&E observed an unpaved area, approximately one-quarter acre in size, located between the fuel oil AST area and the wastewater treatment plant ASTs, which was being used to stage soil, asphalt, and other construction/excavation debris. This area was identified on an unlabelled site drawing as having contained “old ash ponds”.
- EB-2 was constructed in 1979, in an area formerly used for coal storage. In August of 1987, CL&P notified the USEPA that it intended to close EB-2 by “clean closure.” As part of closure operations, basin sludge was removed from the surface impoundment and de-watered on-site during the period from May through July, 1989. The wastes were determined to be non-hazardous. Following waste removal, laboratory analysis of sub-liner soil indicated that soils did not meet all clean closure performance standards. Consequently, the former EB-2 area was closed as a landfill, following installation of a modified low permeability cap (flexible membrane liner) in December 1990. The unit has been undergoing post-closure maintenance and groundwater monitoring since that time.

Discussion

The following notes and associated attachments expand on the conclusions reached in each step of the Environmental Indicator Determination for RCRIS Code CA 725. Headings used for these notes correspond to the item numbers in the determination work sheet.

General

- In this evaluation, the Connecticut DEP’s Industrial/Commercial Direct Exposure criteria were used to evaluate the risk (if any) that these soils pose to human receptors, through direct contact;
- Groundwater in the aquifer beneath the section of Milford in which the facility is located is classified as GB, according to the CTDEP’s Water Quality Classification for the Housatonic River Basin. Because this classification indicates that groundwater in this area is unsuitable for drinking without treatment, and because the subject facility and surrounding community are serviced with public water, ingestion of contaminated groundwater is not a viable route of exposure. Consequently, the USEPA’s Maximum Contaminant levels (MCLs) for drinking water are not considered valid regulatory standards for the purpose of this discussion, and groundwater contaminant concentration concentrations were not compared to them, as part of this exercise.

752.2 – Media Contamination Determination

- **Groundwater** – As stated, groundwater in the vicinity of the facility is classified as GB. Use of site groundwater for drinking water is not reasonable under current or future land use scenarios. Because there is no reasonable pathway between on-site constituents in groundwater and potential on-site human receptors under current or future land use, comparison of contaminant concentrations to the MCLs is not warranted.

For a detailed discussion of potential groundwater impacts, please refer to the accompanying “Documentation of Environmental Indicator Determination - Migration of Contaminated Groundwater Under Control” document.

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- **Air (Indoors)** – Groundwater contamination from RCRA units is limited to RCRA metals and phenanthrene. The CTDEP has not promulgated volatilization criteria for these contaminants. There is, therefore, no valid regulatory criterion for evaluating the potential impact of soil and/or groundwater contaminants upon indoor air quality.
- **Surface Soil** – Limited surface soil contamination was encountered at the subject site; mainly in the vicinity of the Bulk Fuel Oil Storage Tanks, and the former ash lagoons. That contamination was limited to RCRA metals in various samples and SVOCs in one sample from the petroleum bulk storage area. The primary contaminant of concern is arsenic, detected from 83 to 2.5 ppm. in the Bulk Fuel Oil Storage Area, and from 230 to 6.17 ppm in the former ash pond area

As indicated, contaminated surface soils in the former EB-2 unit were removed as part of RCRA closure of that area.

- **Surface Water** – While there are no surface water bodies on the premises of the Devon facility, the entire western portion of the facility is bordered by the Housatonic River (“the Housatonic”), a few miles upstream from its discharge into the Long Island Sound. It has been determined that groundwater from the site discharges to the Housatonic, under tidal influence.

While contaminants have been detected in groundwater in excess of SWPC, it is not known whether contaminants have actually discharged to the Housatonic River at or above those concentrations. Based upon RCRA groundwater monitoring results, it appears that contaminant concentrations have decreased during the course of that monitoring, and will continue to decrease with further monitoring. In addition, flow calculations indicate that, due to the high base flow in the Housatonic River, it is highly unlikely that groundwater contaminated in excess of SWPC would adversely impact the Housatonic River.

For a detailed discussion of potential impacts to surface water, please refer to the accompanying “Documentation of Environmental Indicator Determination - Migration of Contaminated Groundwater Under Control” document..

- **Sediment** – M&E collected a number of sediment samples from the Housatonic River, adjacent to the Devon facility. No applicable human health standards for sediments were found to exist during the course of this evaluation. In lieu of a more appropriate criterion, the contaminant concentrations were compared to the I/C DEC for soil.

While measurable concentrations of various contaminants were encountered in many of the samples, only one (1) sample exhibited a contaminant concentration (for arsenic) in excess of this criterion. In this instance, an arsenic concentration of 22 mg/kg was encountered (compared to the I/C DEC of 10 mg/kg for Arsenic).

- **Subsurface Soil** – As can be seen from the attached tables, limited surface soil contamination was encountered at the subject site; mainly in vicinity of the Bulk Fuel Oil Storage Tanks, and the former ash piles

It should also be noted that a review of historical information revealed that sampling of sub-liner soil in the former EB-2 area as part of the RCRA closure activities indicated that soils did not meet all clean closure performance standards. Consequently, contaminated subsurface soil may still remain at this location.

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- **Air (Outdoors)** - Groundwater contamination from RCRA units is limited to RCRA metals and phenanthrene. The CTDEP has not promulgated Volatilization Criteria for these contaminants. There is, therefore, no valid regulatory regulatory criterion for evaluating the potential impact of soil and/or groundwater contaminants upon indoor air quality.

752.3 - Exposure Pathway Determination

Given the contaminant concentrations and locations, along with current site use and site development, viable pathways do not appear to exist for human exposure to contaminants detected in various media on-site . The rationale for this determination is presented below, for each environmental media.

- **Groundwater** – According to the CTDEP’s Water Quality Classification for the Housatonic River Basin, groundwater in the aquifer beneath the section of Milford in which the facility is located is classified as GB. Because this classification indicates that groundwater in this area is unsuitable for drinking without treatment, and because the subject facility and surrounding community are serviced with public water, ingestion of contaminated groundwater is not a viable route of exposure, nor will it be in the future, under foreseeable scenarios.

Furthermore, there is no viable indirect route of exposure of facility employees or construction workers to contaminated groundwater.

- **Air (Indoors)** – Groundwater contamination from RCRA units is limited to RCRA metals and phenanthrene. No volatilization of these materials would be expected, under normal conditions. Consequently, no viable exposure pathway exists.

- **Surface Soil** –

- **Bulk Tank Storage Area** - Soil in this area is covered by approximately 6” to 1’ of gravel. Access is extremely limited by the surrounding berm, along with above ground piping traversing the surface of this area.

The likelihood of site workers, construction workers and trespassers coming into contact with contaminated surface soils in this area is small, under current site conditions. Any event would be minimal and short-lived. Furthermore, no indirect exposure pathways to these surface soils, such as inhalation of air-entrained surface soil contaminants and/or and ingestion of contaminated food crops, are reasonable for human receptors, under current land use conditions.

- **Former Ash Pond Area** - While site workers, construction workers and trespassers may be exposed to contaminated surface soils in this area, any exposure would be minimal and short-lived. However, further risk evaluation would be required to verify a determination of “no significant exposure”. However, it is the facility owner’s intention to pave this area, effectively removing the possibility of human contact with surface soils.
- **Former EB-2 Unit Area** - As stated, contaminated surface soils were removed from this area as part of RCRA closure.

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- **Surface Water** – Surface water samples were not collected from the Housatonic River, in the vicinity of the Plant, as part of this exercise. The portion of the River in the immediate vicinity of the plant is not, however, used for recreation or any other purposes which would lead to prolonged direct contact with contaminants (if present) originating from the plant.

Furthermore, there are no commercial shellfish beds or finfish harvesting areas in the vicinity of the plant. Finally, because of the tidal nature of the Housatonic in the vicinity of the plant, any surface water contamination resulting from Plant operations (if present) would be quickly dissipated prior to contact with any receptors.

For a detailed discussion of potential impacts to surface water, please refer to the accompanying “Documentation of Environmental Indicator Determination - Migration of Contaminated Groundwater Under Control” document..

- **Sediment** – Only one sediment sample exhibited contamination (for arsenic) above the I/C DEC for soil. There is no reasonable potential for direct exposure of human receptors to this contamination, as these sediments are below 8-10 feet of turbulent water, in an area not used for recreation.
- **Subsurface Soil** – As stated, limited subsurface soil contamination was encountered at the subject site; mainly in vicinity of the Bulk Fuel Oil Storage Tanks, and the former ash lagoons.

- **Bulk Tank Storage Area** - Facility personnel will not come into contact with subsurface soil in this area during normal work assignments. Construction workers may come into contact with subsurface soils in excess of I/C DEC levels as a result of soil excavation for facility construction or renovation. The likelihood of significant excavation in this area, with its ASTs and network of aboveground pipes, is, however, extremely unlikely. Any excavation which might occur would be minimal and short-lived.

Furthermore, no indirect exposure pathways to subsurface soils, such as inhalation of air-entrained surface soil contaminants and/or and ingestion of contaminated food crops, are reasonable for human receptors, under current land use conditions.

- **Former Ash Pond Area** - Facility personnel and trespassers will not come into contact with subsurface soil in this area during normal work assignments. While construction workers may be exposed to contaminated surface soils during excavation, any such exposure would be minimal and short-lived. Furthermore, because the site is not used for growing food crops, indirect exposure, via ingestion of contaminated food is not a viable pathway.
- **Former EB-2 Unit Area** - Contaminated subsurface soils exist in this area. The unit is, however, under RCRA post-closure care. Consequently, contact of facility personnel or constructions workers with this soil is prohibited, without prior USEPA approval.
- **Air (Outdoors)** - Groundwater contamination from RCRA units is limited to RCRA metals and phenanthrene. No volatilization of these materials would be expected under normal conditions. Furthermore, because the majority of the soil surfaces are covered with gravel, roadways, or permanent structures, the potential for wind entrainment of contaminants present in surface soils is negligible.

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752.4 – Exposures can not be reasonably expected to be significant

The only identified areas with a complete exposure pathway with the potential to pose an unacceptable risk to human health are the Former Ash Ponds, the Former Coal Storage/Ash Disposal area, and the Tank Farm area. As detailed in the attached “Human Health Risk Assessment”, the residual surface soil contamination identified in these areas would not reasonably be expected to pose a current or future significant risk to human health, in the absence of remedial action.